

November 24, 1967

Mailing Address

Declass Review by NGA.

Subject: Request for Proposal No. RD-8-68 Project No. 02318

Reference: (a) Development Objectives "Common Stage for High-Power Stereoviewers" dated 29 September 1967.

(b) Specification No. DH-1001 "Contractual Documentation to be supplied by contractors", dated 31 August 1966.

Attention:

Dear Sir:

is pleased to propose to design and manufacture one prototype of a common stage fixture for the High-Power Stereoviewer in accordance with the reference (a) Development Objectives.

We propose for your consideration four alternate design approaches which are described in enclosure (a), Technical Proposal. We propose a fixed price contract. A cost analysis for each alternate is presented in enclosure (b), Cost Proposal. Each alternate is complete in itself and any one may be selected. For performance on the contract, we will require a High-Power Stereoviewer be made available at our facility as customer furnished equipment at no cost to the

If desired we will install the prototype common stage viewer on the customer furnished stereoviewer for delivery. The specified delivery designates the time required after receipt of an executed contract or after receipt of the customer furnished Stereoviewer, whichever is later.

Our proposed price and delivery, for each alternate in:

Alternate #1

Alternate #2

Alternate #3

Alternate #4

Delivery

3 months

3½ months

4 months

4½ months

We propose that payment be made in accordance with enclosure (c), Proposed Payment Schedule.

Contractual documentation required in the performance of the contract will be submitted in accordance with reference (b) specification.

This proposal is valid for 90 days.

Very truly yours.

Encl. (a) Technical Proposal
Encl. (b) Cost Proposal
Encl. (c) Proposed Payment Schedule

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Enclosure (a)

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TECHNICAL PROPOSAL

Common Stage For ☐ High-Power Stereoviewer

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Proposed Alternate #1

This alternate proposes a design substantially like the one illustrated in the Development Objectives received with the request for proposal. It has several excellent features:

- (a) It is a minimum cost approach.
- (b) It requires very minor and possibly no modification of the Stereoviewer (as per 3.1.1 of the development objectives).

Assume the left hand stage will be the master stage as shown in the illustration. It will be firmly fixed to the left hand stage of the Stereoviewer.

The right hand stage will be the follower stage and will slide on the right hand stage of the Stereoviewer. (If so desired, the customer may at the initiation of the contract designate the opposite hands as master and follower stages.)

The details of fastening the master stage in place will be determined by design layout and will depend on the details of and the clearance around the left hand stage of the Stereoviewer. Possibilities are:

- (a) Clamp the master stage in place thus requiring no alteration at all of the Stereoviewer stage.
- (b) Key the master stage in place as shown in the illustration thus facilitating easy emplacement or removal.

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- (c) Bolt the master stage in place with flat head machine screws. This is the least cost, sturdiest, most rigid attachment but requires drilling and tapping holes in the Stereoviewer stage.

Friction of the sliding motion of the follower stage tends to retard the follower stage, therefore we must reduce the frictional force to a minimum. We will do this in two ways:

- (a) Reduce the coefficient of Friction by installing teflon supports on the follower stage for sliding contact with the Stereoviewer stage.
- (b) Reduce the weight of follower stage and the differential x,y controls to a minimum consistent with sturdiness.

The existing film holders on the Stereoviewer must be removed. If feasible they will be used on the common stage. If that is not feasible, film holders of similar design will be provided.

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There are several disadvantages to the general approach of proposed alternate #1, some of which may be overcome as will be seen in proposed alternate #2. The disadvantages are:

- (a) As the operator adjusts the differential x,y controls of the common stage any unsteadiness of his hand will be transmitted to the follower stage in the vertical direction. Such unsteadiness may cause the follower stage to go in and out of focus at high magnification.
- (b) The x motion (lateral right, left) of the master stage must be transmitted to the follower stage through two pin joints. If the stages are at different levels this may have the

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unfortunate result of lifting the follower stage. See Fig. 1. The force exerted by the link (Fig. 1) on the follower stage must have a horizontal component greater than the friction force in order to move the follower stage. If the vertical component of the link force exerts a clockwise moment which is greater than the counter clockwise moment exerted by the weight of the follower stage, the stage will lift. Unfortunately, this is not easy to predict and may vary with time since friction forces have a habit of getting larger with usage. The y motion (forward and back) of the master stage will be satisfactorily transmitted to the follower stage by providing adequate rigidity and close fits of the differential x,y adjustments.

- (c) When the focus of either of the stages is changed, there will be a slight change in the lateral location of the follower stage. The change will be proportional to $1 - \cos$ of the angle through which the link moves. If the pin joints have a maximum separation and the angle is small, the change will be minimized but there will always be some. If the change is objectionable, the operator can remove it by readjusting the x position differential of the follower stage.

Proposed Alternate #2

Objections (a) and (b) of proposed alternate #1 can be overcome by constraining the follower stage to move parallel to the Stereoviewer stage. This can

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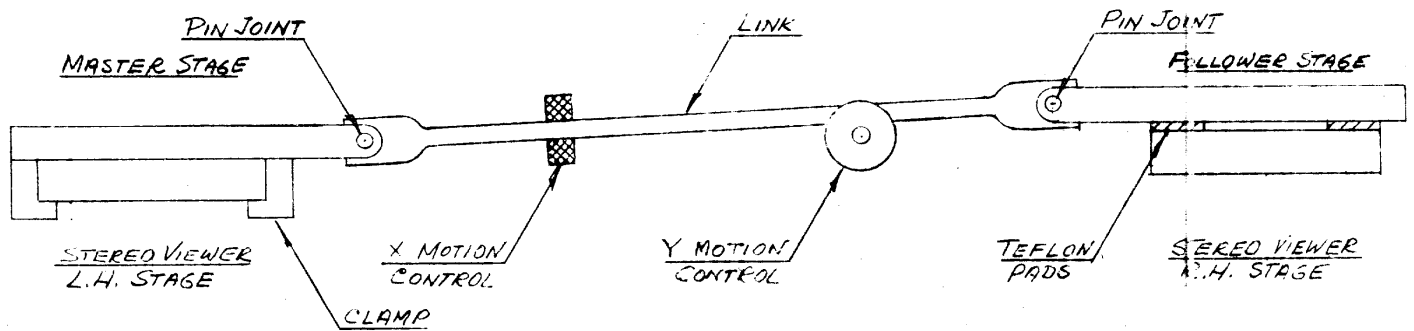


FIG. 1 (a) P. 1

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be done in several ways. One simple solution is to move the right hand pin joint to the right to a position between the teflon pads. The pin joint must also be raised so that the link will clear the stage. Structure of the link will be more complex since it must be a fork to provide two pin joints, one at front and one at back of the follower stage. Steadiness will be greatly improved and the force couples will be more favorable.

To obtain complete restraint, a 3 level construction must be employed for the follower stage. A base, the lower level, will be fixed to the R.H. Stereoviewer stage in the same manner that the master stage is fixed to the L.H. Stereoviewer stage. The middle level will be constrained by slots and pins to move only in the y-direction. The upper level will be constrained to the middle level by slots and pins to move in the x-direction. The link will be attached to the upper level as shown in Fig. 1 for the follower stage.

Since weight of the link is no longer critical, we can make the x,y differential controls more convenient. Objection (c) of alternate #1 unfortunately, is still with us.

Proposed Alternate #3

A completely different approach is necessary in order to eliminate the objections enumerated for alternates #1 and #2. In alternate #3 we have looked at the instrument from the operator's point of view and have put primary emphasis on usability.

The basic Stereoviewer is a very fine instrument and considerable ingenuity has gone into making the stages and controls compact and convenient. Maximum usability is attained by maintaining the basic stages intact and unchanged. To this end we propose in alternate #3 to install a solid stand in the center between the two microscopes on which is mounted a stage similar to a stage of the Stereoviewer. From this extends a rigid arm to the left supporting the

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film holder under the master stage. To the right extends another arm holding a microscope stage having limited x,y and z travel and counter balancing the left arm. The center stage moves both arms together accomplishing a common stage function for the full 2 x 3 inch translations.

How many of the parts of the existing stages can be used will be determined by design layout.

Although alternate #3 is more costly to design and manufacture and will require more modification of the existing Stereoviewer, we consider it to be a more satisfactory solution. The style and quality of the original instrument will be maintained. All the disadvantages of the other alternates will be overcome. The design approach is inherently more sturdy and convenient.

Proposed Alternate #4

Prior to selection of a final design approach for providing a common stage fixture for the Stereoviewer, we propose in alternate #4 to examine five possible solutions in some detail. A preliminary design layout and manufacturing cost estimate will be made for each. After consultation with the Technical Representative of the Contracting Officer, one design approach will be selected for detail design and manufacture of a prototype.

The five possible solutions will consist of the three alternates already described plus two additional concepts. We have tentatively selected the following as the two additional concepts:

- a) Interconnection of the Stereoviewer stage controls by an x-direction cable drive and a y-direction cable drive.
- b) Servo follow up drive of the stage controls.

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